



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/758,866	01/16/2004	Toivo T. Kudas	41890-01684	8009

7590 05/05/2004

Marsh Fischmann & Breyfogle LLP  
Suite 411  
3151 South Vaughn Way  
Aurora, CO 80014

EXAMINER
----------

MAI, NGOCLAN THI

ART UNIT	PAPER NUMBER
----------	--------------

1742

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

<b>Office Action Summary</b>	<b>Application No.</b> 10/758,866	<b>Applicant(s)</b> KODAS ET AL.	
	<b>Examiner</b> Ngoclan T. Mai	<b>Art Unit</b> 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 1/16/04.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 92-118 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 92-103, 105-110, 112-115, 117 and 118 is/are rejected.
- 7) ☒ Claim(s) 104, 111 and 116 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 107, 109, 110, 115, and 118 are rejected under 35 U.S.C. 102(b) as being anticipated Gier, Sr.

Grier discloses a copper conductor paste comprising a mixture of an oxidized copper powder having particle size of 1-10  $\mu\text{m}$ , glass frit comprising about 1-10 wt.% of the solid mixture and 15-25% volatile decomposable fluid suspension vehicle. See col. 3, lines 35-60. The glass frit reads on the limitation binder phase and the volatile decomposition fluid suspension vehicle, which comprises 30% of poly-n-butyl methacrylate in 70% butyl carbitol acetate reads on the limitation organic vehicle phase. See col. 5, lines 35-50. The oxidized copper powder having copper oxide on it surface reads on applicants' composite particle, which contains metal phase of copper and non-metallic phase of copper oxide.

Art Unit: 1742

3. Claims 107, 109, and 118 are rejected under 35 U.S.C. 102(e) as being anticipated by Tani et al, US patent No. 5,981,069.

Tani et al discloses copper paste containing a mixture of copper powder coated with copper phosphate having a diameter of about 0.2  $\mu\text{m}$  to 1.0  $\mu\text{m}$  and glass frit dispersed in organic vehicle. See 3, lines 30-63.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 92-96, 98-103, 105, 107 and 117 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asada et al. in view of Tani et al. US Patent No. 5,588,983.

Asada et al discloses a spherical, single-crystal metallic powder of 1  $\mu\text{m}$  or smaller in particle size, wherein the powder is of at least one member selected from Pd, Ag, Ni and Cu. See col. 2, line 26 to col. 3, line 48. Asada et al also teach a conductive paste where the spherical single-crystal metal powder is made into a paste by dispersing powder in vehicle comprising ethyl cellulose and milling. See col. 3, line 51-col. 4, line 12. Note that single-crystal has crystallite size very close to particle size. Thus the single-crystal metallic powder taught by Asada et al would have crystallite size of 1  $\mu\text{m}$  or less, which reads on the claimed crystallite size.

Art Unit: 1742

The difference between the claim and that is Asada et al is that Asada et al. do not teach a binder phase.

However it well known in the art to form conductive paste by combining copper powder with glass frit and dispersed in organic vehicle. See Tani et al. col. 2, lines 31-41. Tani et al teach combining 80 parts by weight of copper, 7 parts by weight of glass frit and 13 parts by weight of organic vehicle to form conductive paste.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the in the proportion taught by Tani et al the spherical single-crystal metallic powder taught by Asada with glass frit as it is well known in the art, to form conductive paste absence unexpected result.

With regard to claim 93-94, Tani et al taught the copper used to form copper paste must be free of oxidation and uniform in particle size, where as note in Table 1 the copper powder contains at least 90 weight percent of the particles less than twice the average particle size. It would have been obvious to one skilled in the art at the time the invention was made to use powder taught by Asada et al having uniform particle size as disclosed by Tani.

With regarding claims 99 and 100 Tani et al. disclose these limitation in col. 2, lines 31-41.

With regard to claims 103 and 105 Tani et al disclose coating the copper powder with stearic acid to form a thin film or a protective coating on the entire surface of each particle, see col. 1, line 61 to col. 2, line 10. It would have been obvious to one of

Art Unit: 1742

ordinary skill in the art at the time the invention was made to coat the copper powder of Asada with stearic acid to protect the copper powder from oxidation.

6. Claim 106 is rejected under 35 U.S.C. 103(a) as being unpatentable over Asada et al and Tani et al. as applied to claim 92 above, and further in view of Grier, Sr.

The difference between the claim and that of Asada et al and Tani et al is that the primary references do not teach coating the metal with a metal oxide.

Grier discloses a copper thick film conductor composition comprising Cu particles which have been preoxidized to form a surface layer of CuO, glass frit dispersed in organic medium, col. 3, lines 38-45. Grier teaches that the glass frits have resistance to chemical change under reducing environments in the firing oven and when combine with metal oxide form an excellent bond with the ceramic or alumina substrate. Grier col. 1, lines 41-47 and col. 2, lines 12-26.

Based on this teaching it would have been obvious to one of ordinary skill in the art at the time the invention was made to coat the copper taught by Asada et al with a metal oxide taught by Grier to have better bonding with ceramic or alumina substrate.

7. Claims 107, 109, 110, 112, 113, 114, 115 and 118 are rejected under 35 U.S.C. 103(a) as being unpatentable over Siuta in view of Grier, Sr.

Siuta discloses a metal oxide-coated copper powder, suitable for conductors in multilayer, having average particle size of 1-5  $\mu\text{m}$ , where the metal oxide is an oxide of metal selected from Si, Ti, Ce, Zr, Al, Ba, Li, Sr, La, Mg, Ca, V, Ta and mixtures thereof.

Art Unit: 1742

See col. 4, line 6 to col. 5, line 42. The metal oxide-coated copper powder taught reads on the limitation "composite particle" having metal phase of copper and non-metallic phase. Siuta also teaches a printable thick film paste comprising the above metal oxide-coated copper particles in organic medium.

The difference between Siuta and the claims is that Siuta does not teach a paste containing a binder phase.

Siuta however teaches that it is known by Grier patent to form conductor composition comprising Cu particles, which have been preoxidized to form a surface layer of CuO, glass frit dispersed in organic medium, col. 3, lines 38-45. In the Grier patent the glass frit is taught to have resistance to chemical change under reducing environments in the firing oven and when combine with metal oxide forms an excellent bond with the ceramic or alumina substrate. Grier col. 1, lines 41-47 and col. 2, lines 12-26.

Base on this teaching it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine glass frit disclosed by Grier with the metal oxide-coated copper powder taught by Siuta to have better bonding with ceramic or alumina substrate.

With regarding to claim 115 Siuta discloses the limitation in TABLE 1.

8. Claim 108 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tani et al. US patent 5,981,069 (now Tani 1) in view of Tani et al. US Patent No. 5,588,983 (now Tani 2).

Art Unit: 1742

Tani 1 teaches the claimed thick film paste except Tani 1 does not teach the particle size distribution of copper metal particles.

Tani 2 teaches to form thick film paste the copper powder is required to be free from oxidation and uniform in particle size. In Table 1 the copper powder disclosed contains at least 90 weight percent of the particles less than twice the average particle size. It would have been obvious to one skilled in the art at the time the invention was made to use powder taught by Tani 1 having uniform particle size as disclosed by Tani 2 to form thick film paste.

9. Claims 97, 104, 111 and 116 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoclan T. Mai whose telephone number is (571) 272-1246. The examiner can normally be reached on 7:30-4:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Art Unit: 1742

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Ngoctan T. Mai  
Primary Examiner  
Art Unit 1742

n.m.